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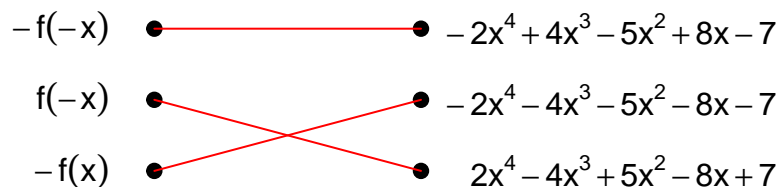
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Exam: Function Reflections (Solution version 14)

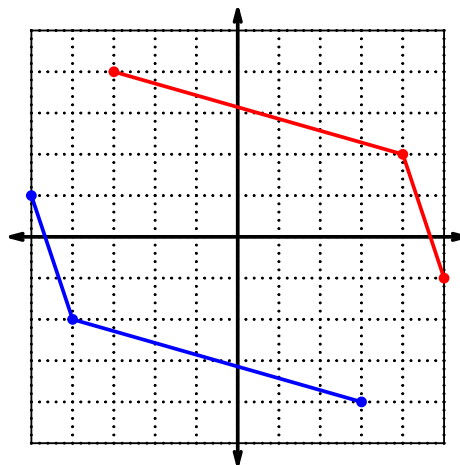
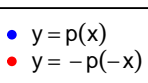
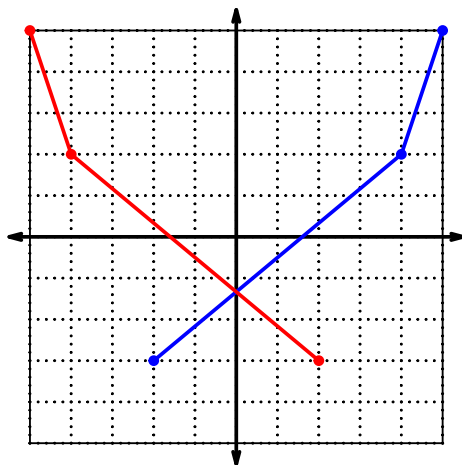
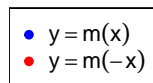
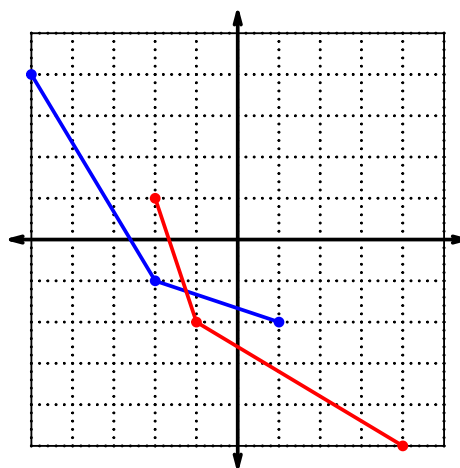
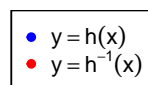
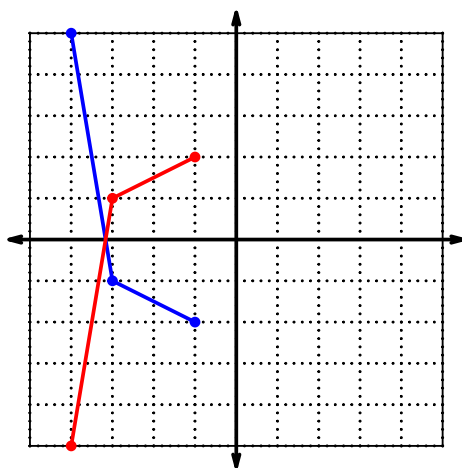
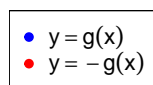
1. Let function f be defined by the polynomial below:

$$f(x) = 2x^4 + 4x^3 + 5x^2 + 8x + 7$$

Draw lines that match each function reflection with its polynomial:

Reflections**Polynomials**

2. In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f , g , and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	8	6	1
2	2	5	7
3	4	9	2
4	6	2	9
5	7	3	8
6	3	8	4
7	1	4	3
8	9	7	5
9	5	1	6

3. Evaluate $f(6)$.

$$f(6) = 3$$

4. Evaluate $h^{-1}(8)$.

$$h^{-1}(8) = 5$$

5. By filling more rows of the table, it is possible to make function g **even**. If that were done, what would be the value of $g(-2)$?

If function g is even, then

$$g(-2) = 5$$

6. By filling more rows of the table, it is possible to make function h **odd**. If that were done, what would be the value of $h(-1)$?

If function h is odd, then

$$h(-1) = -1$$

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7. A function, f , is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g , is **odd** if $g(x) = -g(-x)$ for all x in the domain.

Let polynomial p be defined with the following equation:

$$p(x) = -x^3 - 1$$

- a. Express $p(-x)$ as a polynomial in standard form.

$$\begin{aligned} p(-x) &= -(-x)^3 - 1 \\ p(-x) &= x^3 - 1 \end{aligned}$$

- b. Express $-p(-x)$ as a polynomial in standard form.

$$\begin{aligned} -p(-x) &= -(x^3 - 1) \\ -p(-x) &= -x^3 + 1 \end{aligned}$$

- c. Is polynomial p even, odd, or neither?

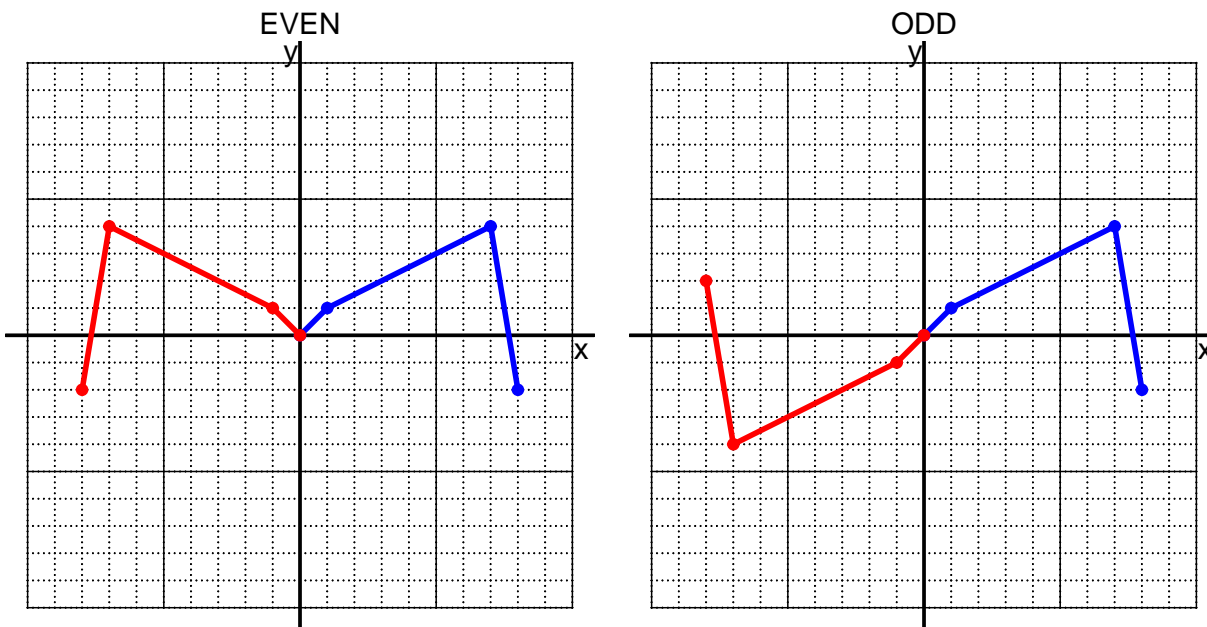
neither

- d. Explain how you know the answer to part c.

We see that $p(x)$ is not equivalent to either $p(-x)$ or $-p(-x)$, so p is neither even nor odd.

Exam: Function Reflections (Solution version 14)

8. I have drawn half of a function. Draw the other half to make it even or odd.



9. Let function f be defined with the equation below.

$$f(x) = \frac{x}{9} + 4$$

a. Evaluate $f(90)$.

step 1: divide by 9

step 2: add 4

$$f(90) = \frac{(90)}{9} + 4$$

$$f(90) = 14$$

b. Evaluate $f^{-1}(11)$.

step 1: subtract 4

step 2: multiply by 9

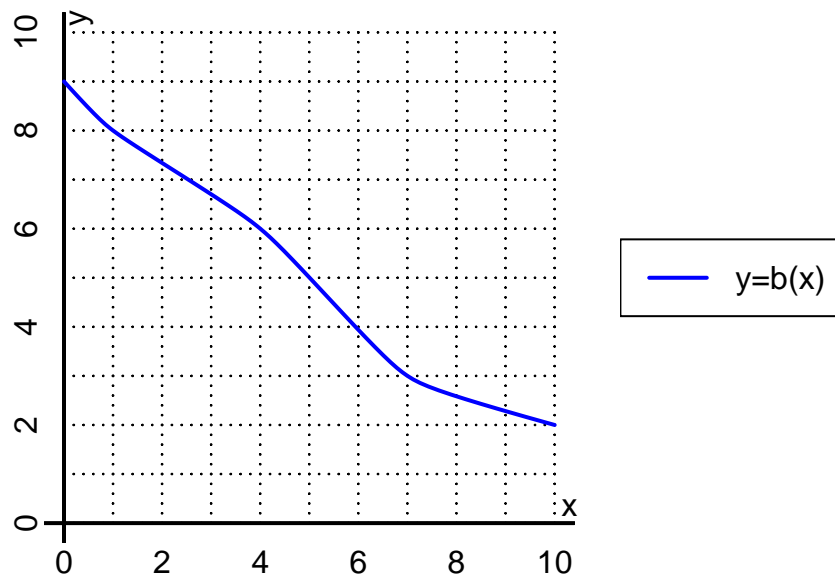
$$f^{-1}(x) = 9(x - 4)$$

$$f^{-1}(11) = 9((11) - 4)$$

$$f^{-1}(11) = 63$$

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10. The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(4)$.

$$b(4) = 6$$

b. Evaluate $b^{-1}(8)$.

$$b^{-1}(8) = 1$$

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11. Function f is defined by the table below.

a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	-9	9	-9	9
-1	5	-5	5	-5
0	0	0	0	0
1	5	-5	5	-5
2	-9	9	-9	9

b. Is function f even, odd, or neither?

even

c. How do you know the answer to part b?

Function f is even because column $f(-x)$ matches column $f(x)$ exactly.